

WHAT IS CLAIMED IS:

1. A process for fabricating a fiber reinforced polymeric foam composite comprising introducing a foamable mixture into a low binder fiber mat and then expanding the foamable mixture into a polymeric foam between top and bottom facing sheets such that
5 the fibers of the low binder fiber mat become dispersed within the polymeric foam, wherein the low binder fiber mat is part of a first composite web that further comprises a support mat.
2. The process of Claim 1, wherein the fibers of the low binder expandable fiber mat become substantially distributed within the polymeric foam.
- 10 3. The process of Claim 1, wherein the low binder expandable fiber mat comprises glass fibers.
4. The process of Claim 1, wherein the support mat is a facing sheet.
5. The process of Claim 1, wherein at least one of the facing sheets contains a fiber facing sheet that is not wet through by the foamable mixture.
- 15 6. The process of Claim 1, wherein at least one of the facing sheets contains an aluminum sheet.
7. The process of Claim 1, wherein the foamable mixture produces a polyurethane or polyisocyanurate foam.
8. The process of Claim 1, wherein the reinforced polymeric foam composite
20 has a thickness of greater than two inches (5.08 centimeters).
9. The process of Claim 1, further comprising a second composite web that contains a second low binder fiber mat, which has the foamable mixture dispersed therein, disposed on a second support mat that is permeable by the foamable mixture, the second composite web oriented either (a) with the second support mat proximate to and above the
25 low binder fiber mat of the first composite web or (b) with the second low binder fiber mat adjacent to the low binder fiber mat of the first composite web.
10. The process of Claim 9, wherein the fiber reinforced polymeric foam composite has a thickness of greater than two inches (5.08 centimeters).
11. The process of Claim 1, comprising the steps:

- a) conveying a length of a first composite web containing an low binder fiber mat disposed onto a support mat;
- b) dispensing a foamable mixture onto the low binder fiber mat of the composite web;
- 5 c) conveying a length of top facing sheet such that the low binder fiber mat and foamable mixture are between the support mat and top facing sheet;
- d) constricting the support mat and top facing sheet through a metering gap, achieving penetration of the foamable mixture into the low binder fiber mat; and
- 10 e) expanding the foamable mixture into a polymeric foam.

12. The process of Claim 11, further comprising conveying a second composite web containing a low binder fiber mat and a support mat onto the foamable mixture prior to step (c) such that the support mat of the second composite web is adjacent to the foamable mixture; wherein the second composite is between the top facing sheet and low binder fiber mat of the first composite web after step (d).

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13. The process of Claim 11, further comprising prior to step (a), conveying a length of bottom facing sheet onto which the support mat of the first composite mat is conveyed in step (a); wherein step (d) further comprises constricting the top and bottom facing sheet through the metering gap and either the support mat is penetrable by the foamable mixture or becomes adhesively affixed to the bottom facing sheet.

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14. The process of Claim 1, comprising the steps:

- a) conveying a length of bottom facing sheet;
- b) conveying above the bottom facing sheet a first expandable fiber mat;
- c) conveying above the expandable fiber mat a composite web oriented such that the composite web's support mat is below its low binder fiber mat;
- 25 d) conveying a length of top facing sheet above the composite web;
- e) dispensing a foamable mixture between at least one of:

- (i) the bottom facing sheet and first expandable mat, if dispensing occurs prior to step (b);
 - (ii) the first expandable fiber mat and support mat of the composite web, if dispensing occurs after step (b) and prior to step (c); and
 - (iii) the composite web's low binder fiber mat and top sheet, if dispensing occurs after step (c);
- f) constricting the bottom and top facing sheet through a metering gap, achieving penetration of the foamable mixture into the expandable fiber mat and low binder fiber mat; and
- g) expanding the foamable mixture into a polymeric foam.

15. The process of Claim 14, wherein the first expandable fiber mat is part of a second composite web.

16. The process of Claim 14, wherein the bottom facing sheet is part of a second composite web that contains the first expandable fiber mat and wherein steps (a) and (b) are accomplished simultaneously by conveying the composite web containing the bottom facing sheet and first expandable fiber mat.

17. A fiber reinforced polymeric foam composite comprising a fiber reinforced polymeric foam between a top and bottom facing sheet; wherein said fiber reinforced polymeric foam composite is characterized by containing an expanded composite web, as is evidenced by the presence of a support mat and by having low binder fiber mat substantially distributed in the reinforced polymeric foam.

18. The fiber reinforced polymeric foam composite of Claim 17, wherein the fiber reinforced polymeric foam has a thickness of greater than two inches (5.08 cm).

19. The fiber reinforced polymeric foam composite of Claim 17, wherein the fibers are glass fibers.